

Climatological Data for October, 1909.

DISTRICT No. 2, SOUTH ATLANTIC AND EAST GULF STATES.

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METEOROLOGICAL SUMMARY FOR OCTOBER, 1909.

Generally speaking, unusually bright, pleasant weather prevailed in the South Atlantic and east Gulf States during the month of October. The temperature was moderately below the normal over most of the district, the rainfall was small except at a few stations, the sunshine was abundant, and the conditions generally ideal for all forms of outdoor occupation. The average number of clear days was very large, ranging from 20 in Florida to 24 in Georgia and Alabama, and there were only 4 or 5 days with rain. The rainfall occurred in brief periods with long intervals of fair weather, and at many places drought continued during the entire month. It must be considered rather remarkable that in Florida six stations received no precipitation whatever during October.

Nevertheless there were some abnormal meteorological features worthy of special note. A very severe West Indian hurricane passed near the southern extremity of Florida on October 11, causing dangerous gales, heavy rains, and a phenomenally low atmospheric pressure from Key West to Miami, Fla. The damage to property in Monroe and Dade counties, Florida, is said to have approximated several million dollars; hundreds of houses were destroyed and about thirteen lives were lost. The barograph at Sand Key, where the Weather Bureau office was destroyed, showed a pressure of 28.36 inches at 10:40 a. m., on October 11. On the same day the lowest atmospheric pressure was observed at all stations in the district, though the pressure outside of Florida did not fall below 29.66 inches at Charlotte, N. C.

The second noteworthy feature for the month was the series of unusually destructive hailstorms that occurred in the central-northern portion of Georgia on the afternoon and evening of October 14. These local disturbances formed in the southeast quadrant of a barometric depression central near Marquette, Mich., with a pressure of 29.30 inches on the morning of October 14, and advanced from the Alabama boundary line directly eastward, extending from Rome south to Jonesboro and east to Athens, Ga. The storm was especially severe at Atlanta; very large hailstones fell and the damage to property was conservatively estimated to have exceeded \$50,000.

The first killing frosts of the season occurred at many of the more elevated stations in the South Atlantic States on October 13. The advance of the marked area of high atmospheric pressure from the upper Lakes to the south Atlantic coast on October 20, when the barometer rose above 30.50 inches (maximum pressure 30.58 inches at Lynchburg, Va.), did not bring with it so pronounced a decline in temperature as the more moderate high pressure area that descended over the district on October 25. On that date killing frosts were quite general with temperatures a few degrees below freezing in the middle and mountainous sections of all States in the district.

TEMPERATURE.

The mean temperature for the month was below normal over the greater portion of the district, except in Alabama and Mississippi, where a slight excess in temperature occurred. The deficiencies were least in Florida and gradually increased toward the north. In eastern North Carolina at a few individual stations the departure exceeded 5° , but on the average for the district the departure was about 2° . In Virginia, North Carolina, and South Carolina the month was as cold as any October for which there is record. October in 1895, 1896, and 1907 rank nearly equal with the present month in low mean temperature. A slight excess in the monthly means, exceeding

2° at a few stations, occurred in the central and southern portions of Alabama and Mississippi and in western Florida. The monthly mean temperatures ranged from 77.4° at Key West, Fla., and 71.7° at Biloxi, Miss., to 48.0° at Hot Springs, Va., the only station at which the October mean was below 50° .

The month was one of marked extremes in temperature. In southern portions of the district the highest temperatures occurred generally between the 1st and 5th, farther north between the 7th and 10th. The maximum exceeded 90° in all States except Virginia and North Carolina. In Georgia the highest temperature for the month, 98° at Bainbridge (which is also the highest for the district), has been exceeded in October only once since 1891, namely in 1901, when 101° was recorded. On the other hand, the minimum temperature in all States except Florida was a few degrees below freezing. At Hot Springs, Va., the lowest temperature was 18° on October 29. In Georgia the minimum, 24° at Clayton on the 25th, was the lowest recorded with the exception of 21° registered in 1892. Although heavy to killing frosts occurred at many stations on October 13, the most pronounced cool wave spread over the district on the 25th, when frosts were more general and extended into northern Florida with light frosts at eight stations.

PRECIPITATION.

The precipitation for October, 1909, as shown by the State averages, was below the normal in all the South Atlantic and east Gulf States, the deficiencies being least in South Carolina and Mississippi and greatest in Florida. Moderate excesses in rainfall occurred in limited portions of central South Carolina and in northern Georgia, and rather marked excesses in the extreme southern and in the western portions of Florida. The distribution of precipitation in Florida was most irregular. Under the influence of the West Indian hurricane of October 11 very heavy rains fell in the southern portions of the State, namely, in Lee, Dade, and Monroe counties, the largest monthly total rainfall being 21.08 inches at Miami; Key West received 16.87 and Hypoluxo 10.63 inches. There was also a region of excessive rainfall in extreme western Florida and southern Mississippi, Pensacola receiving 8.13 inches and Pascagoula, Miss., 8.17. Yet between these regions of copious precipitation the rainfall was extremely small, no less than six stations on the west coast of Florida receiving no rain whatever during the month.

Over most of the district the rainfall for the month ranged between 1 and 2 inches, comparatively few stations reporting more than 4 inches. In all States many places received less than 1 inch. The following cooperative stations received no appreciable rain during the month: In Florida, Carrabelle, Clermont, Jasper, Macclenny, Middleburg, Newport, and Wausau; and in South Carolina, Jacksonboro, a trace only.

In North Carolina, South Carolina, and portions of Florida and Georgia showers occurred on the 5th or 6th, but the first general rain over the entire district occurred from the 10th to 12th and was caused by the subtropical disturbance south of Florida. After a brief interval of fair weather general rains again fell over the district on the 14th and 15th in connection with a marked disturbance that passed eastward across the Lake region. Scattered rains then occurred on various dates from the 20th to 24th, the remainder of the month being fair. Comparatively few stations reported heavy rains in brief intervals of time; the maximum amounts in twenty-four hours were: Key West, 11.23 inches on the 10th and 11th, and Miami, 9 on the 11th. A remarkable local heavy rain occurred on the 20th near the mouth of the Mobile River, Pensacola, Fla.,

receiving 5.47 inches and Pascagoula, Miss., 6.35 inches in twenty-four hours.

The average number of days with rain was 3 in Georgia, Alabama, and Florida, 4 in Mississippi, and 5 in North Carolina, South Carolina, and Virginia.

RIVER CONDITIONS.

The rivers did not reach the flood stages at any stations during October. As September was relatively dry and the rivers at the close of the month were at low stages, the small amount of rain received in October was hardly sufficient to maintain a normal flow.

MISCELLANEOUS PHENOMENA.

In Virginia the prevailing wind was from the northwest; in North Carolina from the southwest; in South Carolina, Georgia, and Florida, from the northeast; and in Alabama and Mississippi, from the north. The average hourly velocity exceeded 10 miles at but five places, namely, Hatteras, N. C., average hourly velocity, 14.3 miles; Savannah, Ga., 11.1; Jupiter, Fla., 15.8; Key West, 12.9; and Pensacola, Fla., 12.9. The maximum velocity during the hurricane was 83 miles an hour from the northeast at Key West on October 11. Hatteras reported a maximum velocity of 45 miles from the southwest on the 15th, Atlanta 56 miles west on the 14th, and Pensacola 44 miles east on the 20th. The number of clear, bright days was unusually large. Only 2 days were entirely overcast in Georgia, and only from 3 to 5 days in other portions of the district. Excepting the severe local hailstorms in northern Alabama and Georgia on the 14th, the number of thunderstorms was notably small. The killing frosts on the 13th and 25th found but few crops remaining ungathered that could be injured.

THE WEST INDIAN HURRICANE OF OCTOBER 11, 1909.

The tropical disturbance that devastated the southern portion of Florida on October 11, 1909, was traced for several days before its appearance at Key West and warnings of its approach were issued by the Weather Bureau well in advance. On Sunday morning October 10 the storm was central over western Cuba and had begun to be felt at Key West, although the barometer at that place fell very slowly during the day, reaching only 29.80 inches by 9 p. m. The continuous rain, however, the easterly ocean swell gradually increasing toward night, and the rising northeast wind gave sufficient indication of the near approach of the hurricane.

During the night of the 10th the barometer at Key West continued to fall steadily, reaching 29.52 inches at 6 a. m. of the 11th, after which the decrease in pressure became remarkably rapid, giving a minimum atmospheric pressure at 11:40 a. m., of 28.52 inches or 1 inch lower than at 6 a. m. A similar remarkable fall in pressure occurred at Sand Key, about 6 miles southwest of Key West, where the barometer fell to 28.36 inches. This is believed to be the lowest atmospheric pressure ever observed in the United States, the lowest previous record being 28.48 inches during the Galveston hurricane of September, 1900. The pressure curve at Sand Key during the storm is shown in fig. 1.

At Key West the rain which had continued steadily with occasional heavy gusts since 9:15 a. m. of October 9 became excessive shortly after 4 a. m. of the 11th and from 8:45 to 11 a. m. the downpour was almost torrential, 6.13 inches of rain falling in two hours and fifteen minutes. The wind increased to a gale from the northeast at 6:45 a. m. and continued until 1:15 p. m., the storm thus lasting six and one-half hours. The maximum velocity for five minutes was 83 miles from the northeast at 10:05 a. m., with an extreme velocity of 94 miles for one minute. At 11:40 a. m. the wind suddenly shifted from northeast to northwest and the barometer began to rise rapidly. The backing of the wind indicated that the hurricane had recurred to the east south of Key West. Thence it passed along the extreme southern portion of Florida eastward into the

Atlantic Ocean. At Miami, Fla., the maximum velocity of wind (about 60 miles) and the lowest pressure (29.22 inches) did not occur until 5:30 p. m. of the 11th. In extreme southern Florida the rainfall at several places exceeded 8 to 10 inches in twenty-four hours, but the rain area did not extend into northern Florida. The general pressure distribution on the 11th and the path of the hurricane are shown in figs. 1 and 2, under "Weather, forecasts, and warnings for the month."

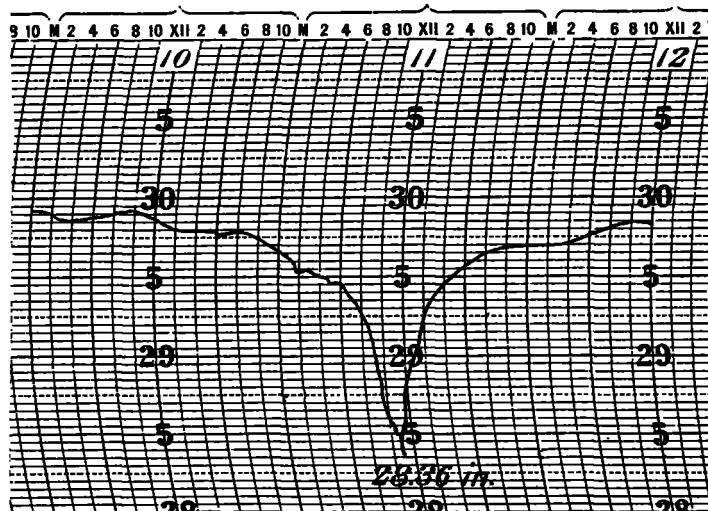


FIG. 1.—Barograph trace at Sand Key, Fla., October 11, 1909.

The damage to property at Key West is estimated at nearly \$1,000,000. About 400 buildings were destroyed. The tide rose into the streets in the northern part of the city and the lifting power of the water combined with the fury of the wind caused many dwellings to collapse or moved them away from their foundations into the streets or vacant lots. A portion of a large concrete cigar factory was blown down. Along the water front more than 300 boats were totally destroyed.

At Miami, Fla., the damage was much less. The gale lasted only an hour, but some buildings were unroofed and flooded with water. The New March Villa, a hotel nearly completed, standing on a prominent elevation, was razed to the ground. A number of shade trees in town and many coconut trees along the beach were blown down.

A number of small keys were swept by the storm, but the total loss of life did not exceed thirteen. The Key West extension of the Florida East Coast Railway suffered considerable loss, portions of the track, trestles, floating equipage, etc., being carried away. Had not the company been fully forewarned of the coming storm the loss of property and of life would have been much greater.

THE SEVERE HAILSTORM AT ATLANTA.

The weather map for the morning of October 14, 1909, revealed the presence of an area of low atmospheric pressure of considerable depth near Marquette, Mich., where the reduced pressure at 7 a. m. (central time) was 29.30 inches. At the same time, however, the pressure was relatively high (above 30.10 inches) over northern Florida and southern Georgia, and there was apparently no well developed trough of low pressure extending southward from the storm center. Nor were there any sharp contrasts in temperature in the central valley or Southern States. By the morning of October 15 the storm had moved far down the St. Lawrence Valley. During the forenoon of October 14 the barometer fell steadily at Atlanta, reaching at noon a station pressure of 28.80 inches, and at 4:50 p. m. 28.60 inches. The weather during the forenoon was not excessively warm, the temperature ranging from 51° to 58°, but it rose between 2 and 4 p. m. to 70°. Showers fell at in-

ervals from 6:25 a. m to 1:25 p. m., after which the sky cleared. The amount of rainfall was small.

About 4:30 p. m. the barometer began to fall more rapidly, and at the same time a dark mass of clouds was observed in the west and southwest which rapidly approached and assumed a very threatening aspect. These clouds, though massive, did not cover a very extended horizontal area, as was indicated by the fact that the rays of the sun, which was then near setting, penetrated beneath the cloud producing a weird yellow glow that continued throughout the storm and alarmed very many people. The wind was fresh from the southeast.

The storm broke over the city at exactly 5 p. m., central time. At this moment the wind shifted to northwest increasing in force and rain began to fall in large scattered drops. The barometer suddenly fell to 28.45 inches, a proof that the storm approached in character a tornado rather than an ordinary thunderstorm. However, nothing in the least similar to a funnel-shaped cloud was seen. Hail began to fall at 5:05 p. m., the wind rose to a maximum velocity of 56 miles an hour, and for a brief time, on account of the remarkable size of the hailstones, the high wind, and the strange yellow light, the force of the storm seemed terrific. The hail ceased at 5:12 and the rain at 5:15 p. m., the wind quickly subsided, shifting back to southeast. The barometer rose rapidly two-tenths of an inch. The temperature did not fall and remained relatively high during the night.

The hail did not fall very thickly but its size was most remarkable, indicating descent from very high altitudes. There were no small hailstones, but they varied in size from an inch to two and a half or even three inches in diameter. Many stones were certainly as large as small oranges. Some pieces evidently formed of several stones frozen together, were 3 to 4 inches long, 2 or 3 inches wide and an inch thick.

The damage caused by the hail in the aggregate was very considerable, and is conservatively estimated to have exceeded \$50,000. The storm passed across the main business section and neighboring portion of the northside residence districts. In the first place, hundreds of large plate glass windows were

broken in all the tall office buildings of which Atlanta has a great many; the combined force of the wind and hail even broke some of the very largest windows in offices and stores on the ground floors or streets. Private dwellings also suffered severely. The rain was then blown into the rooms through the broken windows, but fortunately the damage by water was slight as the rainfall during the storm was quite small. The florists in the city and suburbs suffered the greatest individual losses, all the lights being broken in some cases.

Second, the street railway and telephone systems were quite disorganized for a time. Here and there trolley wires were broken or trees were blown across the tracks. Hundreds of telephones were rendered useless. Live stock, especially horses, mules, and cows, suffered severely; some were killed; many horses and mules attached to wagons became frantic with pain and dashed away, causing a few collisions and other accidents. The owner of a pair of fine horses calmly drove them into a drug store for safety.

While no one was killed, a few people were slightly injured and many had narrow escapes. The most vivid idea of the nature of the storm will be gained from a narrative of the experience of the people who were on the street cars at the time. The electric power was cut off and the cars were suddenly left in darkness. As this sometimes happens in ordinary weather it alarmed no one. But presently hail began to bombard the roofs of the cars with great force, many of the windows were broken in, and the passengers, many of whom were ladies, were drenched with water. Under these conditions the panic was so great that clerks in the nearest stores rushed to the rescue and placed the women in safety. For a short time it was dangerous to walk along the streets on account of danger from falling glass.

On the same date similar storms occurred over a limited district in north-central Georgia lying between Elrod and Fayette counties on the west and Clarke County on the east. The experience of Atlanta was repeated at Rome, Cartersville, Marietta, Chattahoochee, Jonesboro, and many smaller towns. Some houses were destroyed and several lives lost.

